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INTERNATIONAL
TSUNAMI
INFORMATION
CENTER

INTERGOVERNMENTAL
OCEANOGRAPHIC
COMMISSION - UNESCO

INTERNATIONAL TSUNAMI INFORMATION CENTER

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TSUNAMI NEWSLETTER is published by the International Tsunami Information Center to bring news and information to scientists, engineers, educators, community protection agencies and governments throughout the world.

We welcome contributions from our readers.

The International Tsunami Information Center is maintained by the U.S. National Oceanic and Atmospheric Administration for the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization. The Center's mission is to mitigate the effects of tsunamis throughout the Pacific.

MEMBER STATES

Present membership of the International Coordination Group for the Tsunami Warning System in the Pacific comprises of the following States:

CANADA
CHILE
COLOMBIA
COOK ISLANDS
ECUADOR
FIJI
FRANCE
GUATEMALA
INDONESIA
JAPAN
KOREA (REPUBLIC OF)
MEXICO
NEW ZEALAND
PERU
PHILIPPINES
SINGAPORE
THAILAND
UNITED KINGDOM (HONG KONG)
USA
USSR
WESTERN SAMOA

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NEWS EVENTS

The Eruption of Mauna Loa, Hawaii

The world's largest active volcano, Mauna Loa, in Hawaii, erupted at 1:00 A.M. (local time) on March 25, 1984. It was the first to occur since July 6, 1975. Prior to that, the volcano was quiet for 25 years.

The eruption began at the summit of the volcano and later extended both to the southwest and northeast, with vents at the 12,000-foot elevation of the 13,680-foot high mountain. Later that day, another fissure at the 11,200-foot elevation produced a 2 1/2-mile-long flow toward the south. At 5 P.M., another fissure opened at the 9,400-foot elevation and that fissure continued to be the main source of lava throughout the rest of the eruption.

Initially, the 9,400-foot vent sent four lava flows to the east, cutting power lines at the 6,000-foot elevation on March 26. The flows also threatened Kulani prison for awhile, but slowed down and never touched the facility.

The northernmost of the four flows continued a slow advance toward the higher elevations of Hilo, causing concern to residents in both the Kaumana and Waiakea Uka areas of Hilo.

However, that flow stopped on March 30, four miles from the closest inhabited area of Hilo, and 16 miles from its point of origin high on the face of Mauna Loa.

The stagnation was caused by the creation of a parallel branch flow breaking out of the side of the main flow at the 5,600-foot elevation. The branch flow eventually rejoined the main flow.

On April 5, a new branch flow was formed at the 6,800-foot elevation, again drawing off lava which had seemed to threaten Hilo.

On April 8, lava venting shifted from the lower system of vents to the higher, 9,400-foot elevation, and began producing meandering, short flows that never produced a danger to populated areas. The lava output gradually began falling day by day. Fountaining ceased on April 13. On April 16, geologists declared the eruption ended.

(Honolulu Advertiser and Honolulu Star-Bulletin)

Violent Wave Action Reported off the Jiangsu Coast, China

An earthquake occurred in Shanghai Region of China on May 21, 1984. According to articles in the local press some damages occurred in Shanghai. The quake shook people from their sleep. Also, according to the press no vital services were interrupted. At the time of the quake there were 19 freighters and passenger steamers at sea in the vicinity. It was noted that those nearest the epicenter off the

Jiangsu coast northeast of Rudong, did experience violent wave action. But by early morning on May 22, all 19 vessels at sea had reported by cable that they endured the quake without accident or injury.

ITIC is seeking information on the nature of the wave action that affected the ships to determine if this was a result of a seaquake or of a tsunami and will report in the forthcoming issue of the Newsletter.

Pacific Congress on Marine Technology

On April 24-27, 1984, the Pacific Congress on Marine Technology (PACON 84) was held in Honolulu, Hawaii at the Princess Kaiulani Hotel. The Congress was organized by the Marine Technology Society-Hawaii Section and the Center for Engineering Research, University of Hawaii at Manoa. The Congress was sponsored by the East-West Center; Sea-Grant College Program of the University of Hawaii; Defense Mapping Agency; National Ocean Service, NOAA; U. S. Agency for International Development; Center for Engineering Research; SEACO Inc.; Pan Pacific Institute; Chinese Petroleum Corporation; Pacific Basin Development Council; Law of the Sea Institute; American Geophysical Union; Pacific Science Association; and the Tsunami Society.

PACON 84 was organized and co-chaired by Dr. Narendra Saxena, Department of Civil Engineering, University of Hawaii at Manoa, Dr. Fujio Matsuda, University of Hawaii President was chairman. The session was opened on 24 April with a keynote address by Dr. John Byrne, Administrator, U.S. National Oceanic ə Atmospheric Administration. A theme session entitled "The Pacific Basin and Marine Technology" was held in the first day with subsequent sessions on Undersea Vehicles ə Ocean Robotics, Marine Technology for Fisheries ə Aquaculture, Remote Sensing ə Oceanographic Satellites, Ocean Energy, Positioning ə Navigation, Offshore Engineering, Mineral Resources, Pacific Hydrography/Bathymetry, Artificial Reefs, Tsunami Detection Systems, Marine Project Financing, Marine Economics ə Planning, Duman, Marine Education, Buoy Technology ə Oceanographic Instrumentation, and Marine Transportation.

PACON 84 closed on Friday, April 27, and a summary was presented by each session chairman, providing a futuristic view of the work to be done in their areas of study.

The session on Tsunami Detection Systems was chaired by Dr. Adam Zielinski, Memorial University, Canada and Dr. George Pararas-Carayannis, Director of International Tsunami Information Center. The following five papers were presented in this session:

Tsunami Detection Systems for the Pacific Ocean: T.S. Murty, Department of Fisheries ə Oceans, Canada

Open Ocean Tsunami Detection and Warning System: Adam Zielinski, Memorial University, Canada; Narendra K. Saxena, University of Hawaii at Manoa

Operational Aspects of Tsunami Detection for the Pacific Tsunami Warning Center: Gordon D. Burton, Pacific Tsunami Warning Center

Design and Development of an Intelligent Digital System for Computer-Aided Decision-Making During Natural Hazards: W.M. Adams, G.D. Curtis, University of Hawaii at Manoa

Regional Early Tsunami Warning System Utilizing System Technology: George Pararas-Carayannis, International Tsunami Information Center

The Second Pacific Congress on Marine Technology (PACON 86) will be held in Honolulu, Hawaii on April 21-24, 1986.

Business Meeting of the Tsunami Society

On 27 April 1984 a business meeting of the Tsunami Society was held in Honolulu, Hawaii following the Pacific Congress and Marine Technology Conference. Present were: William Adams, George Curtis, Charles Mader, Tad Murty, and George Pararas-Carayannis.

The purpose of the meeting was to discuss the business of Tsunami Society and assign responsibilities for the publication of the Society's Journal.

The following changes of officers were decided: Bill Adams will resign as President of the Tsunami Society due to illness. Gus Furomoto will continue as Vice-President but will assume the responsibilities of the President until election of officers are held. George Pararas-Carayannis will continue as Secretary of the Society, but George Curtis will become the Treasurer. Chuck Mader will become the Journal's Production Editor, and Tad Murty will become the Technical Review Editor. Additional people may be appointed to the editorial board to review papers submitted to the Society.

The Group agreed on the importance of putting out on a regular basis a journal as a means of increasing membership or sustaining present membership. Sufficient papers have been submitted for two more issues of the Journal and the next issue will be expedited. However, funding for the publication is still a problem.

Bill Adams informed the Group that the Hazard Mitigation Conference scheduled for Las Vegas this summer has been postponed for a later time due to other conflicting events.

The Group agreed that a meeting of the Tsunami Society should be held concurrently at the ITSU and IUGG meetings in Victoria, B.C., Canada in July, 1985. Prior to that however, solicitation for nomination of new officers should be made and election of new officers should be held. The Group also agreed that the Tsunami Society should increase its visibility by collaborating or sponsoring events and conferences as it did with the Pacific Congress on Marine Technology (PACON 84), which was held in Honolulu.

INTERNATIONAL TSUNAMI INFORMATION CENTER

Chairman of ITSU and Assistant Secretary, IOC Visit to ITIC

Mr. Gerry Dohler, past chairman of ITSU and Dr. Kazuhiro Kitazawa, Assistant Secretary, IOC, visited ITIC in early February 1984 on their return from their West Pacific mission. The mission to western Pacific nations was carried out in January 1984 by Mr. G. Dohler, Dr. K. Kitazawa, and Dr. Watanabe from Japan. Nations that were visited were the Philippines, Indonesia, and Papua New Guinea, with stops in Honolulu and Tokyo.

While in Honolulu, Mr. Dohler and Dr. Kitazawa reviewed with Dr. G. Pararas-Carayannis, Director ITIC, the mission findings and drafted proposals for funding regional tsunami networks for visited countries, based on the assessment of their needs.

Director of ITIC Participated in ITSU-IX

The Director of ITIC, Dr. George Pararas-Carayannis, participated in the Ninth Session of the International Coordination Group for the Tsunami Warning System in the Pacific on 13-17 March 1984. The Director of ITIC introduced the status report on the activities of the International Tsunami Information Center during 1982-1983. He noted particularly that the Center has worked closely with the Pacific Tsunami Warning Center (PTWC) on such matters as communication tests, automation, regionalization on tsunami watch and warning messages, computer software development, communication problems, and the Tsunami Warning System (TWS), and contingency planning. In addition, the Director reported that ITIC monitored tide stations in the TWS to establish resource capability and assisted PTWC in redrafting tsunami watch and warning procedures, and informing participants of the changes.

Director of ITIC Attended JIMAR Scientific Review

The annual review of the Joint Institute for Marine a Atmospheric Research (JIMAR) was held on March 8, 1984 at the East-West Center, Pacific Room. The Director of ITIC, Dr. George Pararas-Carayannis attended the Scientific Review and particularly the sessions dealing with tsunami research. At this session, two reports were given: one dealing with "Numerical Modelling of Explosively Generated Tsunami Waves" by Dr. C. Mader, and the other one on the "Tsunami Monitoring Program of JIMAR" by Mr. G. Curtis.

Visitors to ITIC

Larry Senechol	Western Administrative Service Center, Seattle.
Gary Barbano	National Park Services, Hawaii
Norman Lamb	State Civil Defense, Hawaii
Bob Tappy	Wang Laboratory, Hawaii
Carroll McCutcheon	Western Administrative Service Center, Seattle.
Walter Dudley	University of Hawaii, Hilo
Min Lee	University of Hawaii, Hilo
Kazuhiro Kitazawa	UNESCO, IOC, Paris
Robert C. Landis	U. S. National Weather Service
Norio Yamakawa	Japan Meteorological Organization
Yoichiro Fujiyoshi	NHK Broadcasting Co., Japan
Iouri Oliounine	UNESCO, IOC, Paris
Norman M. Ridgway	New Zealand Oceanographic Institute
Syd ə Nancy Wigen	Victoria, Canada
Marlene de la Torre	Australian Consulate General
George Kekuna	State Civil Defense

UNESCO - IOC - ITSU

ITSU-IX Held in Honolulu, Hawaii

The United States National Weather Service, Pacific Region hosted the ninth session of ITSU in Honolulu, Hawaii March 13-17, 1984. The meeting was held at the East-West Center, Jefferson Hall.

Mayor Eileen Anderson of the City of County of Honolulu, President Fujio Matsuda of the University of Hawaii and President Victor Hao Li of the East-West Center were speakers for the opening of the Session. Twenty-one delegates from eight member countries participated. The participants toured the Pacific Tsunami Warning Center to familiarize with its operations. A reception honoring the delegates was held at Washington Place, the Governor's house. The participants also attended a Sunset Dinner Cruise.

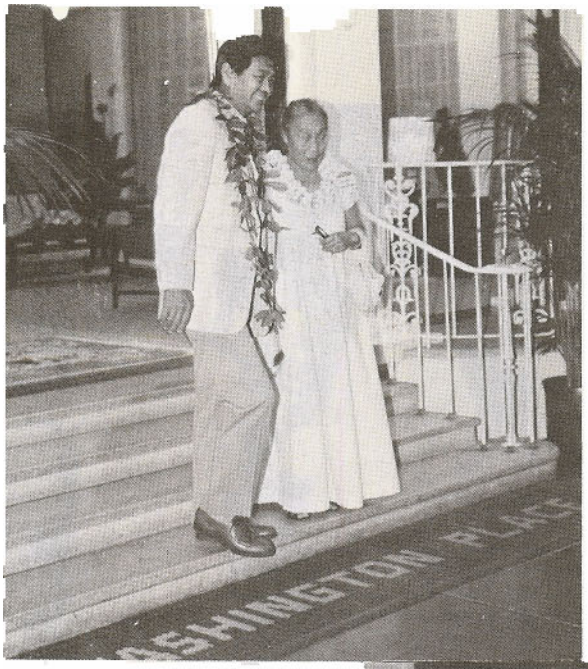
Dr. Iouri Oliounine, Assistant Secretary, IOC/UNESCO, addressing the ITSU-IX Group.

Mayor Eileen Anderson of the City & County of Honolulu, welcoming the delegates of ITSU-IX

Dr. Victor Hao Li
President of East-West Center
giving the Opening Speech

H. Yu (China), Col. M. Jenks (USA), H. Yang (China)
Delegates and Observers at ITSU-IX

Dr. M. Hamnett(USA), V.K. Berdin(USSR), R. Behn(USA), V.O. Bacumov(USSR)



Mrs. R. Hagemeyer welcomes
Governor George Ariyoshi to the
ITSU Reception at Washington Place

L/R: V.O. Bacumov (USSR)
N. Ridgway (New Zealand)
Brig. Gen. R. Bunker (USA)
V.K. Berdin (USSR)

L/R: Dr. I. Oliounine (IOC), G. Dohler (Canada), M. Larche,
Gov. G. Ariyoshi, Dr. G. Pararas-Carayannis (USA)

L/R: Mr. & Mrs. R. Hagemeyer (USA)
Mrs. G. Ariyoshi
Mr. N. Ridgway (New Zealand)

L/R: Governor G. Ariyoshi
Mr. H. Yu (China)
Dr. S. Price (USA)
Mrs. S. Price (Back to Camera)

L/R: Mr. G. Dohler (Canada)
Ms. M. Larche
Dr. I. Oliounine (IOC)
Mr. J. Lander (USA)

(Top) L/R: Mr. R. Hagemeyer (USA)
Mr. & Mrs. G. Burton (USA)
Mr. & Mrs. J. Flavell (New Zealand)

(Middle) Dr. G. Pararas-Carayannis (USA)
Governor G. Ariyoshi

(Bottom) L/R: Mr. R. Landis (USA)
Mr. M. Keyes (USA)
Mr. N. Ridgway (New Zealand)
Mrs. R. Landis

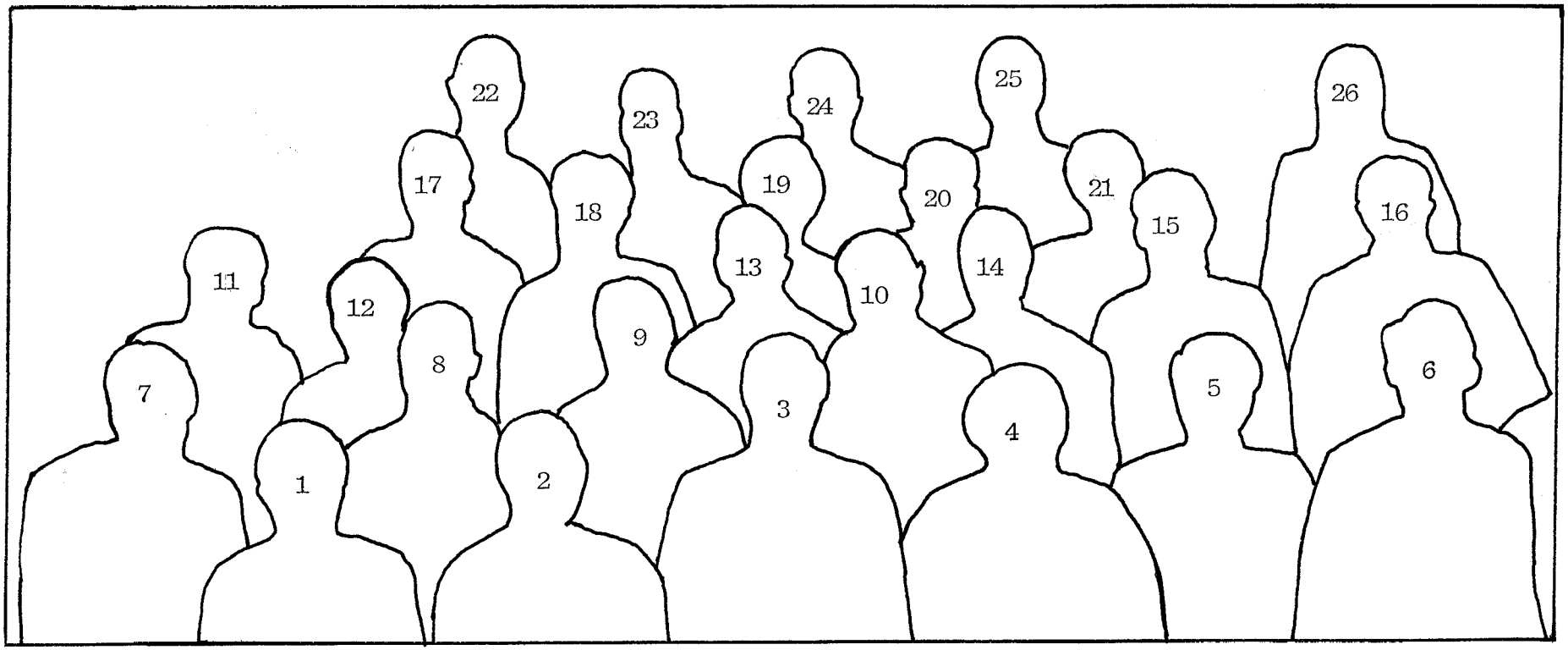
(Top) L/R: Mr. & Mrs. G. Poag (USA)
Mr. H. Yu (China)
Mr. H. Yang (China)

(Middle) Dr. & Mrs. E. Bernard (USA)

(Bottom) L/R: Mr. E. Lorca (Chile)
Mrs. R. Behn
Capt. E. Barison (Chile)
Lt. R. Behn (USA)

L/R: Mrs. W. Hillyard, Dr. H.K. Lam (Hong Kong), Mr. Y. Fujiyoshi (Japan), Dr. N. Yamakawa (Japan), Capt. W. Hillyard (USA)

L/R: Mr. H. Yu (China), Mr. H. Yang (China), Dr. & Mrs. S. Price (USA), Ltjg. I. Byron (USA)



1. V. K. Berdin, USSR
2. G. Dohler, Chairman, ITSU
3. I. Oliounine, Asst. Secretary, IOC
4. G. Pararas-Carayannis, Director, ITIC
5. R. Landis, USA
6. S. Wigen, Canada
7. V. O. Bacumov, USSR
8. H. K. Lam, Hong Kong (UK)
9. E. Lorca, Chile
10. N. Ridgway, New Zealand
11. T. Sokolowski, USA
12. N. Yamakawa, Japan
13. H. Yang, China
14. R. DeRycke, USA
15. P. Krumpe, USA
16. E. Bernard, USA
17. R. Hagemeyer, USA
18. H. Yu, China
19. Y. Fujiyoshi, Japan
20. G. Burton, USA
21. R. Behn, USA
22. G. Hebenstreit, USA
23. J. Flavell, New Zealand
24. G. Curtis, USA
25. J. Lander, USA
26. E. Barison, Chile

Resolutions and Recommendations adopted at the Session

RESOLUTION ITSU-IX.1 -- Master Plan for International Tsunami Warning Operations

The International Coordination Group for the Tsunami Warning System in the Pacific,

Recalling Resolution ITSU-VIII.1 which recommended the development of a Master Plan for the International Tsunami Warning System,

Appreciating the efforts made by the Chairman of the Group in consultations with ITSU experts for the preparation of a paper, "Tsunamis, where... next?" which compiles data and information important and necessary for the Master Plan,

Considering this paper as a sound basis for the future Master Plan,

Urges the Secretary IOC in consultation with the Chairman of the Group to engage an expert for formalizing the Master Plan taking into account comments and proposals made at the Ninth Session of IOC/ITSU.

Recommends that the final version of the Master Plan should be prepared in close cooperation with the Director of ITIC, the Chairman of the Group and the Secretariat IOC.

Recommends further to complete the preparation of the draft of the Master Plan in advance of the Tenth Session and send it to ITSU National Contacts for commends with a view to adopt the Master Plan at the Tenth Session (August, 1985).

RESOLUTION ITSU-IX.2 -- Preparation of Additional Tsunami Travel Time Charts

The International Coordination Group for the Tsunami Warning System in the Pacific,

Recognizing the value of tsunami travel charts and the need for these as expressed by Member States at the ITSU-VIII session,

Considering the difficulties that have been expressed in producing these charts,

Appreciating the effort made by the Secretary IOC in Providing financial support for the developemnt and production of these charts,

Urges the Chairman of the IGC/ITSU to request ITSU National Contacts to inform him by October 1, 1984, of their requirements for new Travel Time Charts,

Requests ITSU National Contacts to investigate and advise the Secretary IOC and the Chairman of the ICG/ITSU of the possibility of developing and producing these charts within their respective countries with IOC support,

Recommends the Secretary IOC in consultation with the Chairman of ITSU to consider proposals and to take necessary measures to commence production of the required charts.

RESOLUTION ITSU-IX.3 -- International Communication Plan for the Tsunami Warning System

The International Coordination Group for the Tsunami Warning System in the Pacific,

Recognizing, with appreciation, the work of the United States in the preparation of the 10th Edition of the "Communication Plan for the Tsunami Warning System,"

Acknowledging that PTWC is the proper linkage for ITSU Member States to effect changes into the above-mentioned Communication Plan,

Recognizing further that there is sentiment for the creation of an International Communications Plan for the Tsunami Warning System, prepared under the aegis of IGC/ITSU, and using as a format document the US National Communication Plan,

Requests the Chairman of the ICG/ITSU through the Director, ITIC to query, in writing, all National Contacts of the Member States of ITSU to determine if they desire the preparation of an International Communication Plan.

Requests further that the Director, ITIC, complete the survey at least six months prior to ITSU-X, and inform the Chairman of the results for action by the group.

RECOMMENDATION ITSU-IX.1 -- Support to the Activities of the International Tsunami Information Center

The International Coordination Group for the Tsunami Warning System in the Pacific,

Recognizing the important function of the International Tsunami Information Center (ITIC) in coordinating research, education, training and publicity relating to tsunamis in the Pacific,

Noting that the activities of the ITIC are hampered by lack of funding,

Recommends that the Secretary IOC make appropriate additional funding available for day-to-day operation of the Centre,

Recommends further that Member States be requested to make trust funds and other funds available to IOC for the purpose of tsunami research, publicity, education and training.

RECOMMENDATION ITSU IX.2 -- Proposed Activities in Order of Priorities for 1985 (I) and 1986-1987 (II)

The International Coordination Group for the Tsunami Warning System in the Pacific,

I

Being informed on the budget and programme of ITSU for 1984-1985,

Taking into account decisions of the Twenty-Second Session of the General Conference of Unesco and the outcome of the Ninth Session of the ICG/ITSU,

Recommends that the following activities should be implemented in 1985:

Support to the activities of the International Tsunami Information Center - staff support (to assist in the preparation of audio-visual materials, updating the library, cataloging the data), run-up surveys, printing

Support for the Director of ITIC and Chairman ITSU to carry-out post-tsunami surveys and to visit Member States to provide guidance on matters relevant to the tsunami watch and warning

Staff and ICG/ITSU officers and experts attendance at subject-related meetings and conferences of other organizations and advisory bodies

Consultant to be invited to finalize a Master Plan

Assistance should be provided for development and publication of Tsunami Travel-Time Charts

Mission to South West Pacific Islands be arranged for 2-3 participants to provide assistance in the further development of regional tsunami warning centers

Publication of the Proceedings of IUGG Tsunami Commission Meeting to be held in August 1985 in Canada

Organization of the Tenth Session of the ICG/ITSU (29 July - 1 August, 1985, Canada)

Support for the organization of the Workshop on the Technical Aspects of Tsunami Analyses, Prediction and Communication (jointly with ITSU-X in Canada, 2-4 August 1985)

Visiting expert programme (travel and early allowances for 3 trainees from the countries of the region)

Requests that the Secretary IOC to allocate money for the above-mentioned activites in accordance with established priorities and existing procedures.

II

Recalling that biannual financial period of UNESCO will expire before 1 January 1986,

Bearing in mind the necessity to provide guidance to the Secretary IOC on the Unesco next biannual programme (1986-1987) and budget in the fields relevant to the ICG/ITSU activities,

Recognizing that during 1984-1985 there may be requests for actions in new fields which were not covered by activities proposed below,

Recommends the Secretary IOC anticipate and secure appropriate funds to support the following minimum of activities needed for the successful implementation of the programme:

Continual support for the activities of the International Tsunami Information Center

Support missions to the countries of the region to provide assistance in the further development of regional tsunami warning centers and of a Pacific-wide Tsunami Warning System

Provide living allowance and travel for the Associate Director, ITIC

Make funds available for the visits of the Director and Associate Director, ITIC, and the Chairman of the ICG/ITSU to give guidance to Member States and to carry out surveys after the occurrence of tsunamis

Support the organization of an intersessional ITSU Consultative meeting in Paris for ICG/ITSU officers and Members of the Secretariat IOC, if possible in conjunction with the session of the IOC Governing Bodies

Provide funds for staff, ICG/ITSU officers and experts attendance at subject-related meetings of other organizations and advisory bodies

Assist in organization of the Eleventh Session of the ICG/ITSU in one of the countries of the Pacific region

Continue assistance for the implementation of the visiting experts programme (4 trainees from the countries of the region).

New Chairman Elected for the International Coordination Group for the Tsunami Warning System in the Pacific (ITSU)

During the ninth session of ITSU, Mr. Norman Ridgway of New Zealand was elected by the Group as the new Chairman succeeding Mr. Gerry Dohler of Canada. Mr. Ridgway has served as Associate Director of the International Tsunami Information Center 1978-1979 and has been New Zealand National Contact of ITSU for the last four to five years. Dr. Norio Yamakawa of Japan was elected Vice-Chairman.

National Reports for the Intersessional Period between 8th and 9th Sessions of ICG/ITSU (April 1982 - March 1983)

At the recent 9th session of ITSU held in Honolulu, Hawaii, ten member states presented national reports which described the tsunami-related activities that had taken place in their countries during the previous two years. Member states who have not submitted national reports are requested to do so prior to 1 June 1984. The reports can be sent to Director, International Tsunami Information Center with copies to the Secretary of IOC and Chairman of ITSU. The national reports will be published in ITIC's "Tsunami Newsletter" before ITSU-X to be held in Canada in July/August 1985.

A List of the USSR Coastal Stations Reported

The new national contact of USSR, Dr. B. P. Khimitch, who is also Chief, Marine, Arctic and Antarctic Dept. informed Mr. Norman Ridgway, the ITSU Chairman, and ITIC of the location of coastal stations in USSR where sea level observations are carried out in support to the National Tsunami Warning System. These coastal stations are:

Petropavlovsk-Kamchatsky
Ust-Kamchatsk
Bering Island
Severo-Kurilsk
Matua Island
Urup Island
Kurilsk
Yuzno-Kurilsk
Poronajsk
Rudnaja Pristan
Nakhodka

This information was requested from the Soviet delegation at the IX Session of the International Coordination Group for the Tsunami Warning System in the Pacific (ITSU-IX) in Honolulu in March of 1984.

List of National Contacts of ICG/ITSU

The following is a list of National Contacts of ITSU members on file in the ITIC office. Please inform ITIC if there are any changes.

CANADA

Mr. Sydney O. Wigen
Tsunami Adviser
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Capitan de Navio
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Director
Instituto Hidrografico de la Armada
Casilla 324
Valparaiso, Chile

CHINA

Mr. Luo Yuru
Director
National Bureau of Oceanography of the
People's Republic of China
Beijing, China

COLOMBIA

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Secretario General
Comision Colombiana de Oceanografia
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COOK ISLANDS

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ECUADOR

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FIJI

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Director, Mineral Development
Mineral Resources Department
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GUATEMALA	Ing. Carlos Rodolfo Martinez Giron Chief of Seismology Section INSIVUMEH 7a. Ave. 14-57, Zona 13 Guatemala, Guatemala
INDONESIA	Dr. Aprilani Soegiarto Directeur Lembaga Oceanologi Nasional of the Indonesian Institute of Sciences Kompleks Bina Samudera P. O. Box 580 Dak Jakarta, Indonesia
JAPAN	Dr. Norio Yamakawa Head, Seismological Division Japan Meteorological Agency Ote-machi, Chiyoda-ku Tokyo, Japan 100
KOREA (REPUBLIC OF)	Mr. Myong Bok An Director of Weather Analysis Central Meteorological Office 1 Songweol-dong, Ching-ku Seoul, 110 Korea
MEXICO	Lic. Ma de los Angeles Lopez-Ortega Ministro Consejero Encargada de Negocios a.i. UNESCO Delegacion Permanente de Mexico 1, Rue Miollis 75732 Paris, France
NEW ZEALAND	Mr. Norman M. Ridgway Dept. of Scientific ∂ Industrial Research New Zealand Oceanographic Institute P. O. Box 12-346 Wellington North, New Zealand
PERU	Contralmirante Jorge A. del Aguila Sanchez Direccion de Hidrografia y Navegacion de la Marina Casilla Postal No. 80 Gamarra No. 500 Chucuito, Callao, Peru

PHILIPPINES	Mr. Conrado M. Santos Chief Geophysicist Physical Science Division Bureau of Coast a Geodetic Survey 421 Barraca St. San Nicolas, Manila, Philippines
SINGAPORE	Mr. Paul Lo Su Siew Director Meteorological Service Singapore P. O. Box 8 Singapore Changi Airport Singapore 9181, Republic of Singapore
THAILAND	Commander Thanom Charoenlaph Hydrographic Department Royal Thai Navy Bangkok 6, Thailand
UNITED KINGDOM (HONG KONG)	Mr. Patrick P. Sham Royal Observatory, Hong Kong 134A Nathan Road Kowloon, Hong Kong
USA	Mr. Richard H. Hagemeyer Director National Weather Service, Pacific Region P. O. Box 50027 Honolulu, Hawaii 96850
USSR	Dr. B. P. Khimitch Head of Marine, Arctic and Antarctic Department The USSR State Committee for Hydrometeorology and Natural Environmental Control 12, P. Morozov Per. Moscow 123376 USSR
WESTERN SAMOA	The Superintendent Apia Observatory Private Mail Bag Apia, Western Samoa
Director, ITIC	Dr. George Pararas-Carayannis Director International Tsunami Information Center P. O. Box 50027 Honolulu, Hawaii 96850 USA (Cable Address: ITIC HONOLULU)

Chairman, ICG/ITSU Mr. Norman M. Ridgway
Dept. of Scientific a Industrial Research
New Zealand Oceanographic Institute
P. O. Box 12-346
Wellington North, New Zealand

NATIONAL AND AREA REPORTS

New Ocean Services Coordinator

Lt. jg. Ilene Byron filled the position of Ocean Services Program Coordinator on Jan. 3, 1984, replacing Marianne Molchan-Douthit. Byron holds a Bachelor degree in Chemistry and has been a NOAA Corps Officer for two and a half years. Prior to joining the National Weather Service, she had served two years aboard a 175 foot circulatory survey vessel, MCARTHUR. Her duties on the MCARTHUR included installing, maintaining and removing tide gauges and current meters in the harbors of Washington, Oregon and California.

Tsunami Stations Inspection

The Pacific Tide Party personnel completed the inspection of the following stations:

Adak, Alaska	19-22 August, 1983
Crescent, California	7 November
Fort Point, California	18 November
Honolulu, Hawaii	24 January, 1984
Nawiliwili, Hawaii	31 January-2 February
Midway Island	2-9 February
Kahului, Hawaii	3-5 February
Hilo, Hawaii	6-8 February
Truk (Moen Island)	22-26 February
Wake Island	5-8 April
Pago Pago, Am. Samoa	8-13 April

ANNOUNCEMENTS

ITSU-X and the International Tsunami Symposium to be held in Canada in 1985

The tenth session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (ITSU-X) is scheduled to be held from July 29 to August 3, 1985 in Victoria, Canada. Following ITSU-X (August 5-9) will be the International Tsunami Symposium of the Tsunami Commission of the International Union of Geodesy and Geophysics. For information write to:

TSUNAMI '85
P. O. Box 2267
Sidney, B.C., Canada V8L 3S8

Revised Catalog of Seismogram Archives

A revised edition of the Catalog of Seismogram Archives: Key to Geophysical Records Documentation No. 9 has been published. This catalog describing the seismograph networks and the instrumentation is from the National Geophysical Data Center's (NGDC) archive. The catalog also lists the recording stations and dates for which seismograms are available. The archived records include those from the Worldwide Standard Seismograph Network (WWSSN), the Global Digital Seismograph Network (GDSN), the Canadian Seismograph Network (CSN), and the People's Republic of China (PRC).

Requests for data, or inquiries about availability of data should be addressed to:

National Geophysical Data Center
NOAA, Code E/GC1
325 Broadway
Boulder, CO 80303

Proceedings of the Tsunami Symposium held in August 1983 Published

The Seventeenth Assembly of IUGG took place in Hamburg, Germany in August of 1983. Two tsunami sessions were held at that time, one on August 19 and the other on August 24. The first one was chaired by H. G. Loomis on Assessment of Natural Hazards and the second was chaired by T. Y. Wu on Tsunami Wave Propagation. A total of 24 papers were presented. The proceedings of these sessions were edited by Dr. Eddie Bernard and published by the U. S. National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory (PMEL).

Proceedings of the International Tsunami Symposium 1981 Available

The proceedings of the International Tsunami Symposium convened by the Tsunami Commission of the International Union of Geodesy and Geophysics (IUGG) held from May 25 to 28 1981 at Sendai, Japan have been published. Fifth-four papers were presented during the ten sessions of the Symposium, however only 39 papers were accepted for publication in the Proceedings. The papers were classified and rearranged in seven major topics:

The Tsunami Impact on Society
Tsunami Source and Earthquake
Historical and Statistical Studies of Tsunamis
Tsunami Generation and Propagation
Topographic Effects on Tsunami Waves
Sea Walls and Breakwaters
Tsunami Runup

Editors of the Proceedings were Dr. Kumizi Iida, Professor Emeritus of the Nagoya University and Dr. Toshio Iwasaki of Tohuku University of Japan.

The Seismic Retrofit of Historic Building Conference

The above mentioned Conference was held in Sacramento, California on April 27, 1984. The meeting was organized by Margaret Pepin-Donat, of the National Park Service. In addition to the National Park Service, the Dept. of Parks and Recreation, State of California, and the Association for Preservation Technology, the American Institute of Architects, the National Trust for Historic Buildings, the Seismic Safety Commission - State of California, the Seismological Society of America, the University of California and ITIC were co-sponsors. The theme of the conference was retrofit and preservation of historic buildings.

Seismic Hazard Model Reports Available

The National Geophysical Data Center announced that the above mentioned reports have been prepared under contract by Woodward-Clyde Consultants. The objectives of the work described in these reports was to develop mathematical models, algorithms, and software to estimate seismic hazards in any tectonic environment. The software documentation consists of two volumes.

Volume I of the SEISMIC.EXPOSURE software package documentation is a user manual for the SEISMIC.EXPOSURE computer program. It consists of algorithms, inputs from the semi-Markov simulation program MARKOV, and mathematical techniques used to estimate the seismic exposure at a site. Use of the program is illustrated by the discussion of input parameters and completion of sample problems. Appendices provide details on data manipulation, computer algorithms, and the computer environment systems information required to transfer programs from the UNIVAC computer, on which the software was developed to another computer system.

Volume II discusses the methodology and data inputs used in the initial application of the SEISMIC.EXPOSURE computer software to the Gulf of Alaska study region. Data inputs and assumptions about geologic and seismicity parameters defined by OCSEAP Seismological Research Unit participants (research contractors) are included. The study area is shown in Figure 1.

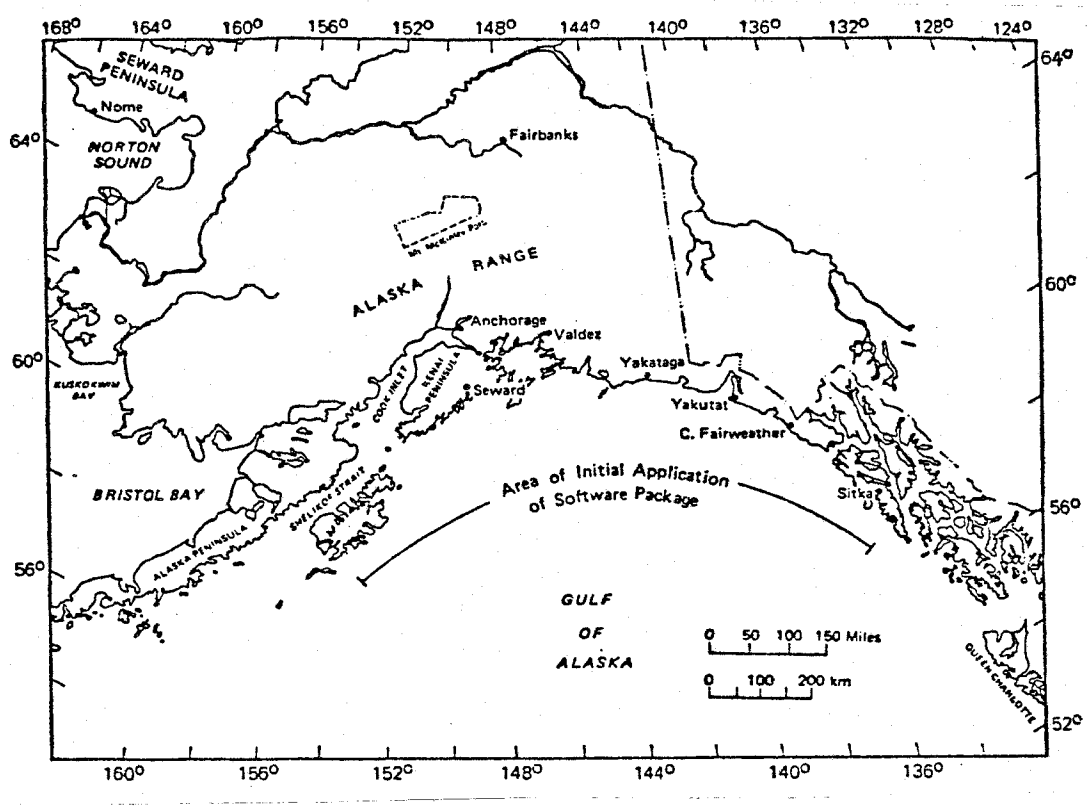


Figure 1. Gulf of Alaska study area for initial application of the SEISMIC.EXPOSURE Model

For inquiries, write to:-

National Geophysical Data Center
NOAA E/GC 3
325 Broadway
Boulder, CO 80303

Tsunami Hazard Mitigation Conference is Postponed

The Second International Conference on Study and Mitigation of Hazards has been rescheduled. The date is being shifted from June 1984 to June 1986. The exact place and time of the 1986 Tsunami Hazard Conference will be be announced at a later date. Those interested in sponsoring the 1986 Conference should write to the Tsunami Society, P.O. Box 8523, Honolulu, Hawaii 96815 (USA). Those interested in chairing a session or presenting a paper should submit suggestions to the above address as well.

Krakatau 1883 and Volcanoes of the World

The National Museum of Natural History, Smithsonian Institution, recently published two books which should be of interest to readers of the Tsunami Newsletter. The first book entitled "Krakatau 1883," is by T. Simkin and R. Fiske. The second is entitled "Volcanoes of the World" is by T. Simkin, L. Siebert, L. McClelland, D. Bridge, C. Newhall and J. H. Latter. The authors of "Krakatau 1883", Dr. Tom Simkin, Curator of Petrology and Volcanology of Smithsonian, and Dr. Richard S. Fiske, Director of the National Museum of Natural History, provided ITIC with review copies of these newly published books and requested review comments.

"Krakatau 1883" by Tom Simkin and Richard S. Fiske is a comprehensive account of the volcanic eruption of Krakatau 1883 and its effects. It includes an extensive introduction on the eruption and its importance, background and historical context, maps, chronology, and narrative descriptions of eyewitness accounts of events, compilations of monograms, review of the international literature on the eruption, and an extensive bibliography. The significance of Krakatau is of particular importance to scientists interested in tsunamis. In addition to Krakatau's global meteorological effects, the tsunami generated by the collapse crested at heights of 34 meters above sea level near Krakatau killing 36,417 people. Smaller tidal disturbances were recorded as far away as France and San Francisco. Several different mechanisms have been advanced to explain the largest waves and the authors have had difficulty in being confident about which generation mechanism dominated and was responsible for the tsunami. On page 368 of this book, the uncertainty concerning the wave generated by the volcanic explosion of Krakatau is described. The authors have asked ITIC to bring this important question of tsunami generation by the Krakatau eruption to the attention of the Newsletter readers hoping that a modern and more authoritative explanation of the tsunami generation would result which in turn would aid the volcanological understanding of this event. ITIC therefore invites comments related to the tsunami generation of the Krakatau explosion for publication in the Newsletter and to provide to the authors.

The authors of the second book "Volcanoes of the World," have also invited review of this publication. The book is a compilation and documentation of 1,343 volcanoes around the world, 23 of which are known to have produced tsunamis. This book allows comparison with the other volcanic regions and searches for distant eruptions in any given time period that might (like Krakatau) have created global effects. The authors have expressed the hope that specialists in other disciplines and other parts of the world will use this book and the Scientific Event Alert Network (SEAN) Bulletin to help them in their effort towards a better record of global volcanism. SEAN is the Scientific Event Alert Network of the Smithsonian Institution to which ITIC also contributes data and information. Comments related to a review of these publications particularly in reference to tsunami are invited. Please write to the Editor of the Tsunami Newsletter,

International Tsunami Informtion Center, P. O. Box 50027, Honolulu, Hawaii 96850, USA.

PTC'85

Pacific Telecommunications Council has announced its 1985 Conference to be held January 13-16, 1985 at the Sheraton-Waikiki Hotel in Honolulu, Hawaii. The theme for the Conference will be "Telecommunications for Pacific Development: Towards a Digital World". The opening plenary sets the stage for PTC'85 with a program on "Political and Economic Realities in the Pacific." The first session will deal with the digital world - what it is, and what it will be like, with overviews of digital activities in three countries and a session on current digital developments. In the second session, the speakers will deal with broadcast and data communication changes and with information services and systems. On the final day, issues of the 1980s and policies and policymaking for a digital world will be discussed. PTC'85 will also feature the continuation of the highly successful telecommunications working groups originated in 1984.

Final Report on the Japan Sea Tsunami of May 1983 Published

"The Japan Sea Central Region Tsunami of May 26, 1983: A Reconnaissance Report" has been prepared by Dr. Li-San Hwang of Tetra Tech, Inc. and Dr. Joseph Hammack of the University of Florida. The study of this report was supported by the National Science Foundation and under grant No. CEE-8219358 to the National Academy of Sciences. Copies of this report can be obtained from:

National Technical Information Service
Attention: Document Sales
5285 Port Royal Road
Springfield, Virginia 22161
(Report No.: CETS-CND-026)
(Price Codes: paper A03, mf A01)

The 7th Australian Geological Convention to be held in Sydney, Australia

The above mentioned convention will be held from August 27 to 28, 1984 at Macquarie University, Sydney, Australia. The purpose of this workshop is to identify the geoscientific needs of the developing countries in the region, especially in Southeast Asia and the Southwest Pacific, and how Australia can best meet these needs. A working group on Geological Hazards in the region will be held subsequently to the Convention on August 30. The group aims to review and explore ways of establishing joint collaborative projects in the region in geological-hazard identification, assessment, mitigation and disaster/emergency response. Concentration will be placed on earthquakes, volcanoes, tsunamis and landslides. ITIC has established contact with the Group offering support and collaboration. A report on

ITIC and PTWC activities will be presented at the meeting by Dr. R. W. Johnson of the Bureau of Mineral Resources, Geology and Geophysics.

A Revised Edition of Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (BATHY and TESAC) Published

The above mentioned guide has recently been published by UNESCO. It replaces the 1975 edition of the same guide. The Integrated Global Ocean Services System (IGOSS) is the international operational oceanic system for the global collection and exchange of oceanic data and the timely preparation and dissemination of oceanic products and services. This document describes the operational procedures for the collection, encoding, quality control and exchange of oceanic surface and sub-surface temperature, salimity and current (BATHY and TESAC) data.

ABSTRACTS

Determination of Earthquake Magnitude from Total Duration Time of Seismic Waves Based on the Automatic Reading for the Kanto-Tokai Observational Net

Mariko Tatsukawa

Since October 1981, automatic reading of seismic waves and determination of earthquake hypocenters and magnitudes by using the data processing system have been carried out for the Kanto-Tokai observational net of the National Research Center for Disaster Prevention. For the purpose of supporting the routine of data processing, coefficients were determined for each station to compute earthquake magnitude from the total duration time (F-P) of automatic reading. The magnitude was so scaled as to coincide with the magnitude of the Japan Meteorological Agency, M_{JMA} by using the least square method. The results were found satisfactory provided poor data are excluded. Then follows a discussion of possible reasons why unfavorable F-P data are sometimes originated from the automatic reading of seismic waves.

[Text in Japanese. Report of the National Research Center for Disaster Prevention, Japan, No. 31, October 1983]

Tsunami Hazard Map of Krakatau

Sumarna Hamidi

The main task of the Volcanological Survey of Indonesia is "Searching for efforts in minimizing catastrophical effect due to volcanic eruptions". One of the efforts in minimizing the victim and material losses is to prepare Volcanic Hazard Zonation Maps. The 1883 Krakatau eruption killed 36,417 human lives, caused by a tsunami that

swept the beach of Banten and Lampung at Sunda Strait. The Hazard Map of Krakatau will be prepared for preliminary delineation of the dangerous zone by tsunami attack in the event of a future eruption followed by the collapse of Anak Krakatau.

The purposes of the map is to guide the local administrator in arranging the safety of the people living in menaced areas along the beach of Banten and Lampung. The map is also available to manage the resettlements in the safe area.

[Presented at Symposium on 100th year development of Krakatau and its surroundings, August 23-27, 1983, Jakarta, Indonesia.]

Early Warning System of Tsunami Hazard

Sujatno Birowo

The article discusses generally what a tsunami is, its characteristics and its effects. It also includes discussions of the historical tsunamis in Indonesia, the importance of Tsunami Warning System, and of the Tsunami Working Group in Indonesia.

[Presented at Symposium on 100th year development of Krakatau and its surroundings, August 23-27, 1983, Jakarta, Indonesia.]

Design and Development of an Intelligent Digital System for Computer-Aided Decision-Making During Natural Hazards

W. M. Adams and G. D. Curtis

In 1975, a Tsunami Seismic Trigger was invented by four people working at the Indiana University of Bloomington. Twelve copies were built and installed at various locations in Hawaii. The design utilized hard-wired logic and a mechanical pendulum. The advent of the microprocessor now prompts the design of a new tsunami seismic trigger, using microprocessors and appropriate support chips. In addition to the improved seismic element, the adaptive algorithmic capability of the microprocessor will provide better threshold-setting and better discrimination in favor of tsunamigenic events. Good design should result in both improved reliability and lower cost-per-unit. Such a tsunami seismic-trigger can assist a local public official in making decisions concerning the need for evacuating people from shorelines that may be inundated by a tsunami generated by a nearby underwater earthquake. The need for such decentralized decision-making is evidenced by the difficulty of maintaining real-time communication capability during a large earthquake. The principles involved may have application in other natural hazard warning systems.

[Proceedings of the Pacific Congress on Marine Technology PACON 84, April 24-27, 1984, pp. OST4/18-23]

Regional Early Tsunami Warning System Utilizing System Technology

George Pararas-Carayannis

There are areas in the Pacific for which the Pacific Tsunami Warning Center (PTWC) in Honolulu cannot provide warning information within one hour after tsunami generation. A need exists for regional early warning systems which can react within 5-10 minutes after a potentially tsunamigenic event has occurred. The equipment needed to assemble an early warning system, from land and sea based sensors to satellite-based communications links is presently available. Such hardware system can be tailored to the needs of national disaster control authorities and skillfully adopted to their existing response apparatus, to enhance the capability to cope with their tsunami threat. Satellite telemetry can be used, not only for data collection, but also to disseminate, receive and display tsunami warnings utilizing the existing Geostationary Operational Environmental Satellite (GOES), Data Collection Interrogation System (DCIS). The use of satellite telemetry allows the lag between the event and the receipt of initial data to be reduced to the order of a few minutes, thus providing enough time for regional early warnings. Integrating this technology into the infrastructure of an existing Civil Defense Response organization is necessary for effective tsunami hazard management during an actual event.

A pilot study named THRUST (Tsunami Hazard Reduction Utilizing System Technology) has been funded by the U.S. Foreign Disaster Assistance (USFDA), Agency for International Development (AID), to determine the feasibility of applying this current technological advances to an early warning system centered on one tsunami susceptible area, both to prove the concept and to develop a prototype for similar early warning systems elsewhere. Valparaiso, Chile was chosen as the site because it represents an urban area with high probability of tsunami occurence.

A program has been developed along specific elements of data collection and analysis in the pre-event, and in the event phases. In the pre-event phase it is necessary to compile historical and all available information related to tsunami effects in the area under study. The purpose of this data collection is to assemble into forms suitable for use in model studies, emergency preparedness plans, training exercises, etc., as part of a complete package. In the real-time phase, the emphasis shifts to collecting quickly and reporting seismic and water level data which can be used to identify the sudden existence of a tsunami and to assess its potential threat. The use of the satellite-based telemetry reduces the data collection time to a minimum. The real-time analysis of the results of the data collection must be combined with an incoming data stream to provide continuous updating of predictions.

In the information dissemination, complete and thorough knowledge of the host country's tsunami response infrastructure is needed, as well as the development of an educational program. The real-time phase

of information dissemination, the actual transmission of the warning information to the threatened population must be interfaced with the automated, satellite-based information gathering network, and the human decision making process. It must be formulated so that the technological hardware merges with the requirements and capabilities of the local disaster response system. Standardization of the procedures must be accomplished and the decision making must be made simpler so that officials will only have one set of procedures to follow and should not find it necessary to improvise responses or evaluate the data. Also because of the public education awareness program the threatened population should know how to respond to ensure their own safety.

The knowledge gained from this study will be applicable to the development of better hazard system management ability and the design of effective regional tsunami warning systems.

[Proceedings of the Pacific Congress on Marine Technology PACON 84, April 24-27, 1984, pp. OST4/24-25]

Tsunami Detection Systems for the Pacific Ocean

T. S. Murty

Present tsunami detection systems for the Pacific Ocean are reviewed. Suggestions are made for future improvements.

[Proceedings of the Pacific Congress on Marine Technology PACON 84, April 24-27, 1984, pp. OST4/1-5]

Open Ocean Tsunami Detection and Warning System

Adam Zielinski and Narendra Saxena

To improve the reliability and accuracy of tsunami forecasts, a warning system, based on high resolution bottom pressure measurements in mid-ocean is proposed and discussed. The critical question of tsunami detectability is considered using available pertinent data on open-ocean tsunami signatures and background noises. It has been demonstrated that the reliable detection of a tsunami with an average amplitude is as small as 0.7 cm is possible using an appropriate signal processing. Tsunami directionality is considered as it effects the spacial location of monitoring stations. The simple model proposed predicts tsunami beamwidth as small as 16 using realistic tsunami parameters.

[Proceedings of the Pacific Congress on Marine Technology PACON 84, April 24-27, 1984, pp. OST4/6-12]

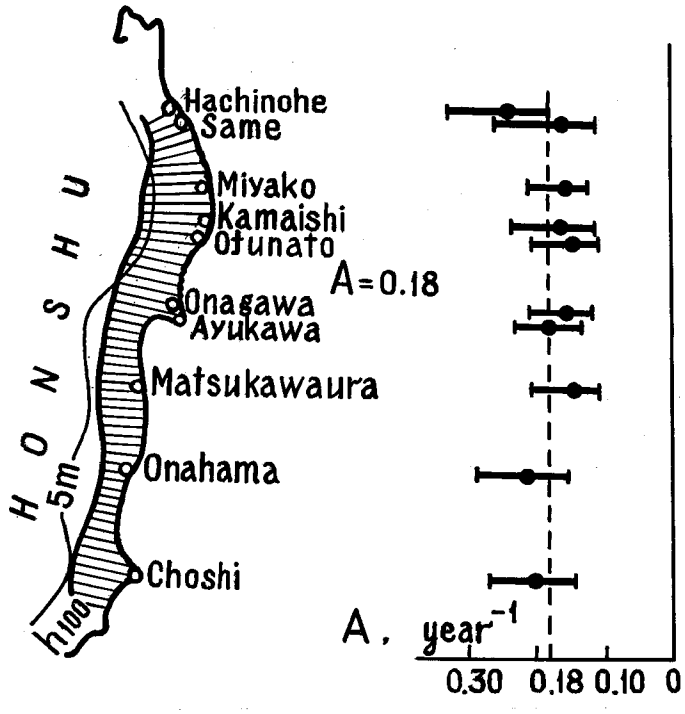
A Two-Parameter Scheme for Tsunami Hazard Zoning

C.N. Go, V.M. Kaistrenko, K.V. Simonov
693002, Yuzhno-Sakhalinsk
Sakhalin Complex Scientific Research Institute

A necessary stage in calculations for prediction purposes is the study of tsunami recurrence function

$$\frac{dN}{dt} = \Phi(h)$$

that yields mean recurrence of tsunami with maximum wave height not greater than a specific level h. The major problem in using these functions for prediction purposes is the fact that a wellrounded approximation of empirical data on wave heights is difficult to obtain since the mathematical model for prediction is extrapolation of this function for tsunami heights whose recurrence remains uncertain. We shall show that the natural relation of observable tsunamis statistics to extremum statistics leads to revealing of at least two and possibly of three temporal scale intervals with different tsunami modes. It has also been clarified that for 10 years $< T < 10^3$ years range of time periods which is the most important one for tsunami wave height prediction purposes the tsunami reoccurence is described by two parameters: frequency A of occurence of large tsunamis and coefficient k of wave amplification near the shore. As an example, a diagram of tsunami hazard zoining of the eastern Honshu coast has been plotted.



Scheme of tsunami hazard zoning of the north-eastern part of Honshu I. Mean Maximum level h_{100} for T = 100 years is compared with a conditional 5 m contour line.

PACIFIC TSUNAMI WARNING CENTER

New TELEX Installed at PTWC

A new telex unit has been installed at the Pacific Tsunami Warning Center (PTWC). It was installed for the initial purpose of setting up alternate communication to Chile to replace NASA communication. However, it is available to all member states who would like to communicate with PTWC directly via this service. The Telex Address Number is 8782PHNL.

Seismic Summary (November 1, 1983 to Press Time)

EVENT NO	EVENT	LOCATION	ACTION TAKEN
1983-16 (PTWC)	Nov 16 1613 (UT) 6.7	Mauna Loa, Hawaii 19.4N 155.5W	Information given over HAWAS.
1983-17 (PTWC)	Nov 24 0530 (UT) 6.9	Banda Sea, 7.8S 127.7E	Earthquake Information Bulletin Issued.
1983-18 (PTWC)	Nov 30 1746 (UT) 7.2	Diego Garcia, Indian Ocean 5.7S 71.6E	No Earthquake Information Bulletin issued. Minor tsunami generated with 5 foot waves in Lagoon of Diego Garcia and 10-40 cm. waves at Seychelles Islands.
1983-19 (PTWC)	Dec 30 2352 (UT) 6.7	Khyber Pass 35.1N 70.5E	No Earthquake Information Bulletin Issued.
1984-1 (PTWC)	Jan 8 1524 (UT) 6.5	Indonesia 3.3S 112.5W	Earthquake Information Bulletin Issued.
1984-2 (PTWC)	Jan 16 1227 (UT) 6.5	Easter Island Vicinity 29.7S 112.5W	No Earthquake Bulletin Issued.
1984-3 (PTWC)	Feb 7 2133 (UT) 7.4	Solomon Islands 9.5S 160.8E	Tidal Station queries issued. Earthquake Information Bulletin Issued.

EVENT NO	EVENT	LOCATION	ACTION TAKEN
1984-4	Mar 6	Honshu Ridge	Earthquake
	0207 (UT)	29.6N	Information Bulletin
(PTWC)	6.6	138.8E	Issued.
1984-5	Mar 19	Uzbek Region,	No Earthquake
	2029 (UT)	USSR	Information Bulletin
(PTWC)	6.8	40.2N	Issued
		63.7E	
1984-6	Mar 24	150 miles East of	Tidal Station queries
	0944 (UT)	Hokkaido, Japan	issued. Earthquake
(PTWC)	7.2	43.5N	Investigation Bulle-
		148.7E	tin Issued.